Materials Science Division Project Safety Review Safety Analysis Form (03/08)

Date of Submission	September 2008	FWP No.:	58405

Project Title	Handling weakly radioactive TEM samples at the IVEM-Tandem User Facility.

Is this a (check one) new submission [X] renewal [ ] supplemental modification [ ]

Principal Investigator(s) M. A. Kirk

Other Participants (excluding administrative support personnel) ian Gan (Idaho NL), Pete Baldo (backup to Kirk)

(Attach participant signature sheet)

Project dates:	Start:	October 6, 2008	End:	October 10, 2008

This form is to be completed for all new investigations or experimental projects that are conducted in MSD laboratories, and for all ongoing such projects that undergo significant change from their original scope of work, or where there has been an addition of a potentially new hazard not covered in the original review. It is not intended to be used for office work, routine maintenance activities, or administrative tasks.

Experimental work may not be performed until the project safety review has been completed, procedures have been approved, and the work has been authorized (ESH Manual 21.2.3).

The completed form and all supporting documentation is to be submitted to the MSD ESH Coordinator by the principal investigator with sufficient advance notice and information to allow a project safety review prior to the beginning of the experiment. The information will be reviewed by the Division Director, members of the MSD safety review team, and by outside experts (if appropriate) for unresolved safety, health, and environmental issues associated with the proposed work. The principal investigator may be asked to resolve outstanding issues through consultations with the safety review team before the work begins. The information submitted will be reviewed by an independent review team, and final approval will be granted by the Division Director.

This form must be accompanied by a participant signature form once work has been authorized.

The principal investigator must be familiar with the responsibilities of a lead experimenter and the general requirements of the experiment safety review in the Argonne ESH Manual, section 21.2.

Useful references:
Argonne ESH Manual: http://www.aim.anl.gov/manuals/eshman/
Argonne Waste Handling Procedures Manual: http://www.aim.anl.gov/manuals/whpm/
MSD Chemical Hygiene Plan: http://www.msd.anl.gov/resources/esh/
Material Safety Data Sheets: https://webapps.inside.anl.gov/cms/msds/

Table of Contents[1]:

List of Attachments:

!. Sample information from Gan.
2. RWP

[1] To update table of contents, right/command click inside table; from resulting contextual menu select "Update field", then "Update page numbers only"

1. Scope of Project (ISM Core Function 1)

1.1 General Description

Provide a general overview description of the project. While scientific background is important, concentrate on an operational description that focuses on the experimental work done in the laboratory.

This project concerns the handling of weakly radioactive TEM samples, in situ ion irradiation, and TEM for research purposes in the IVEM-Tandem Facility electron microscope. The TEM work is covered in project 20006, the ion irradiation work is covered in project 20004.

1.2 Modules of Project

Describe the various components that make up this project. Components can be pieces of equipment or specific hazardous or complex tasks within the project that require special training to use or perform safely. Indicate locations, even if the project consists of only one component. Indicate custodians for major equipment. Attach designs, drawings, or other useful descriptive material.

Samples will be prepared for TEMt Idaho NL, by Jian Gan at his home institution. Transportation of samples will be through approved DOT channels. Handling will consist of mounting samples in TEM holders in the hood facility in G147 (by Kirk) for insertion (by Kirk) into the microscope in G149. Procedures and all radioactivities will be monitored by health physics (HP). An RWP is developed by HP in support of this activity.

1.3 Project Limits

Define the range of samples, chemicals, physical conditions that you consider covered under this project review. For chemicals and samples include either specific cases that are considered extremely hazardous, e.g. silane, HF, etc., or general classes such as reactive metals, oxidizers, etc. In some cases it may be useful to define the envelope by specifically excluding certain hazard categories.

Radioactive samples will be limited to less than 1 μR/hr at 2 cm for each 3 mm disk. No friable (e.g. loose powders) sample material will be permitted. Uranium alloy samples will be depleted to an isotope ratio (235/238) less than 0.003. All samples are approved through the EMC proposal mechanism before experiments are approved and samples shipped. All samples will be shipped back to user's institution immediately at experiments conclusion.

2. Hazard Analysis (ISM Core Function 2)

2.1 Hazard List

Hazard/Issue	Yes	No	Unknown
Does the proposed work, as you perceive it, intrinsically contain the following safety, health, or environmental issues or concerns?			
Chemical Hazards			
Use of toxic chemicals	X		
Use of flammable chemicals	X		
Use of carcinogenic chemicals	X		
Generation of hazardous or toxic wastes	X		
Use of explosive or highly reactive chemicals		X	
Use of strong acids or bases		X	
Use of carbon monoxide gas		X	
Use of hydrogen gas (above 4% concentration)		X	
Use of perchloric acid or perchlorate salts		X	
Use of hydrofluoric acid		X	
Nanomaterials			
Nanoparticles dispersible in air		X	
Nanoparticles dispersible in liquids		X	
Biological Hazards			
Work with Biosafety Level 2 or above[2]		X	
Radiological Hazards			
Use of radioisotopes (see section 6)	X		
Exposure to ionizing radiation (excluding radioisotopes)		X	
Generation of radioactive wastes	X		
Physical Hazards			
Use of Class III or Class IV lasers		X	
Use of cryogenic fluids	X		
Use of high magnetic fields	X		
Use of high voltage or high amperage equipment	X		
Electrical work on energized equipment (>50V)		X	
Operation of equipment at high vacuums	X		
Operation of equipment at elevated pressures		X	
Use of compressed gases		X	
Operation of equipment at high temperatures	X		
Hazardous Working Environments			
Working in areas with high noise levels		X	
Potential exposure to climatic extremes		X	
Working at elevated heights		X	
Entering confined spaces		X	
Use of self-contained breathing apparatus or respirators		X	
Work in areas of mechanical hazards		X	

[2] Requires review by Institutional Biosafety Committee

Other (explain)[3]			

2.2 Hazard Details

For all the hazards checked Yes or Unknown, provide specific details, including locations (unless obvious from 1.3). For highly hazardous or energetic chemicals, indicate specific chemicals, quantities used. For physical hazards, give quantitative details (e.g., voltages for electrical hazards, power and wavelengths of lasers).

Hazard	Detail
Uranium alloys (toxicicity, radioactive, pyrophoric)	These known hazards of uranium are vanishingly small for these sample masses and metal alloy forms. See attached report for details.
Radioisotopes U238, U235	See attached report for quantities and activities.
Radioactive waste	Incidental wastes (wipes, tweezers, etc) will be removed by HP. Contamination is not expected and will be monitored by HP.
Physical hazards	All associated with routine operation of IVEM (TEM) which are covered in SAF 20006. Heating of samples in situ to 200°C well below melting temperature of lowest melting phase of alloys (660°C).

2.3 Waste Produced

Describe types and expected quantities of wastes produced by this project (also see 3.6 for the handling of these wastes). Address all applicable major classes (nonhazardous, hazardous/chemical, radioactive, mixed) and the specific types within these classes. Also include wastes that derive from the future decommissioning of equipment (e.g., transformer oils, accumulated debris in reaction chambers) and termination of projects (leftover chemical inventory, samples, materials).

Possible solid radioactive waste of incidental tissues, nitrile gloves, q-tips, tweezers, and plastic sheet. No non-hazardous waste is expected.

2.4 Effluents and Emissions

Describe types and expected quantities of materials disposed into the water drains (effluent). Include process water if the amount disposed is unusually large (e.g., constantly running water). See ESH Manual 10.4 for rules regarding disposal of chemicals into the waste water stream. Consult with the building manager for stricter rules due to the condition of drain pipes.

None

[3] See ESH Manual 21.3 Appendix A for a more comprehensive list of potential hazards

Describe types and expected quantities of gases, aerosols, and other volatile materials emitted to the atmosphere through the ventilation system (incl. hoods)

None

Are all components of this project considered "bench scale research" (NEPA)? Yes X No ____
[Limited in any single experiment, measurement, or test to 5 gal. or 5 lbs of hazardous material, or 1 lb of extremely hazardous material (40 CFR 355)]

2.5 Interaction With Other Projects

Describe possible interactions with other projects (or separate components within the same project) that are carried out in the same or adjacent spaces. Are there incompatibilities of hazards that need to be mitigated by spatial separation or staggered times of operation (e.g. lasers vs. other work in laser access controlled area). Does this project introduce major hazards into a building that are not covered under the current Building Emergency Plan (Bldg. 223 emergency plan on MSD intranet, http://www.msd.anl.gov/resources/esh/, confer with building managers for other buildings)?

None The SAF 20006 covers the operation of the IVEM. Within the IVEM in situ the samples will experience irradiation by 300 keV electrons and 1 MeV Kr ions. Neither "interaction" will produce any additional safety concerns. With very low probability, any contamination of the sample holder will be monitored by HP and cleaned.

3. Hazard Control (ISM Core Function 3)

3.1 Design Features and Engineering Controls

For all hazards present, describe the design features and engineering controls applied to control the hazards. Engineering controls include enclosures and barriers that cannot be removed without the use of tools, interlocks, ventilation, software controls, etc. Engineering controls are possible and should be first line of control for all hazard classes (chemical, physical, electrical, biological, radiological).

The use of the hood in G147 is prescribed only to serve as an area of isolation, not for toxic vapor removal. The area will be roped off and the rooms (G147 and G149) will be temporarily reclassified as radiological controlled areas. Signs will be posted temporarilyby HP during this week of experiment. No other experiment is possible during this time, as is usual at this facility.

3.2 Procedural Controls

For complex hazardous tasks, describe how the hazards are controlled by the work procedure. E.g., specific order of tasks, verification of instrument readings, required use of special tools, and the like.

The hood area in G147 will be emptied and cleaned. Plastic sheet will be placed in hood. Samples will be clearly marked and stored there until needed. Samples will be mounted in TEM stage holders there when required. Health physics and EMC personnel (Kirk) will attend with outside user (Gan),. Kirk will mount samples. All materials, TEM sample holder, hood surfaces and floors will be examined (smeared) for radioactive contamination by HP.

3.3 Personal Protective Equipment

List personal protective equipment (PPE) to be worn. Be specific to task or situation, unless it applies to all laboratory work in this project. Remember that safety glasses are not sufficient splash protection against certain chemicals. For gloves, be specific as to type appropriate for the task.

Task/Situation	Personal Protective Equipment
G147 sample handling	Safety glasses (ANSI Z87.1 compliant)
	Nitrile gloves.

3.4 Training

Indicate the training required for participation in this project. Include Argonne-supplied training (list course numbers and titles), job-specific training (indicate who provides training, how records are kept), and external training (academic requirement, specialized training and/or certification).

The usual training for EMC users will be required.(ESH377, ESH100U, ESH223, EMC101).
Kirk: ESH700 (Rad Worker 1)

3.5 Chemical Storage

Describe the specific locations where chemicals and gases are stored including type of storage (e.g., flammables cabinet) and how hazardous chemicals are labeled. Include precautions taken for the storage of carcinogens. Indicate who is responsible for keeping the Chemical Management System (barcodes) up-to-date. Attach Material Safety Data Sheets (MSDS) for the particularly hazardous chemicals, and describe where all MSDS are available near the location of the project. The PI must ensure that MSDS for all chemicals used in this project are on file in the Chemical Management System (https://webapps.inside.anl.gov/cms/msds/) and that all participants have ready access to them.

NA

3.6 Sample Storage and Disposition

Describe how and where samples utilized and produced in this project are stored (and labeled!) while not in active use, how long they will be retained, and how they will be disposed of.

Samples will be labeled and stored in the fume hood in G147. They will be sent back to the user when experiments are finished. On October 10, 2008. In addition to labels from Idaho NL, HP will label. Samples are moved by SPM personnel.

3.7 Waste Handling

For all hazardous, radioactive, and mixed wastes, describe where and how they are accumulated (include satellite waste area number), and who will be responsible for writing up the waste for disposal by Waste Management. Indicate any special circumstances (special containers, venting, etc.) regarding the safe storage of waste. Address the prevention of incompatible waste mixtures. Include plans for dealing with the waste produced by the future decommissioning of equipment and termination of projects.

A temporary waste receptacle for possibly contaminated incidental solid materials will be placed and removed by health physics personnel.

3.8 Emergency Management

If this project involves chemical hazards, esp. the use of corrosive chemicals, list locations of eyewash stations and safety showers. Indicate who is responsible for checking eyewash stations weekly.

NA

Include emergency procedures in case of accidents, evacuations, or other hazardous situations. Include egress routes into common areas (hallways), safe shutdown procedures, and other pertinent information. Procedures may be attached. Are all hazard categories posted at the laboratory doors?

Same as SAF 20006 and in ESH108212 and EMC100.

3.9 Additional Hazard Control

Describe here any measures of hazard controls that are not already documented in the previous sections.

None

3.10 Guidance Documents

List all documents, publications, and books, that you have consulted in the hazard analysis and control. Include relevant chapters and sections of the ES&H Manual but do not include those chapters that are requirements documents for other documents (e.g., 4.2). The divisional Chemical Hygiene Plan (http://www.msd.anl.gov/resources/esh/) is mandatory reading for all participants in projects that contain chemical hazards.

Hazard	Guidance
Shipping samples	ESH Manual 5.12.7,8,9
Radiation exposure limits	ESH Manual 5.2.3

4. Working Within Controls (ISM Core Function 4)

4.1 List of Work Procedures

List all work procedures relevant to this project

1. Prepare fume hood area in G147.(Kirk)
2. Unpackage samples with HP present and measure levels. (Kirk)
3. Mount sample in TEM stageholder and insert into microscope. (Kirk)
4. After TEM experiment remove sample and repackage for shipping. (Kirk)
5. Wipe/smear all work areas and HP check for contamination.
6. Dispose or clean all materials or TEM stage which are shown to be contaminated. (Kirk)

4.2 Dosimetry

List locations where radiation dosimeters must be worn. Indicate if a ring is required in addition to the regular badge, and whether neutron dosimetry (type BGN) or not (type BG) is required. Consult with Health Physics regarding requirements.

Location	Dosimetry Requirement
G147 and G149	TLD (BG) for those working with these samples.

Identify individuals who will be issued dosimeters.

Name	Ring (Y/N)	Neutrons (Y/N)
Guest user, Jian Gan	N	N

4.3 Safety Monitoring Equipment

Describe any equipment that is used to monitor safe working conditions (e.g., oxygen monitors, background radiation alarms). Note that all such equipment must be approved by Industrial Hygiene (or Health Physics for radiological monitoring).

HP instrumentation

4.4 Industrial Hygiene Monitoring

List the periodic Industrial Hygiene sampling that is required based on chemical, biological, or other hazardous materials used in this project.

NA.

4.5 Medical Surveillance

Identify individuals who will be placed in a medical surveillance program as a result of their participation in this project.

None

4.6 Working Alone

Indicate which tasks of this project are of sufficiently low hazard that they may be carried out by a participant working alone, in particular off-hours. Alternately, it may be more convenient to list the tasks that are prohibited while working alone. Note if different rules apply to specific qualification levels among the participants (e.g., students).

No one will work alone on this project, as is the usual case in this facility.

5. Feedback (ISM Core Function 5)

5.1 Records Kept

Identify types of records kept with this project that are useful in recreating and improving on the tasks within this project. In particular, include types of records that can be consulted if a task is unsuccessful or produces an unexpected result (in the scientific or operational sense). This could include lab notebooks, datasheets, computer data, instrument logs, images, etc.

Task/Situation	Record Kept
TEM experiment on user samples	User's lab notebooks
Sample records	HP and SPM records and IVEM schedule record.

5.2 Reporting

It is understood that technical results are reported to the outside world in scientific publications, presentations, and technical reports, and to the sponsor in program reviews, contractor meetings, and progress reports. Identify here the channels utilized to report the *operational* experience within the project, division, Argonne, or across the DoE complex. This should include emergency notifications, line management notifications, Lessons Learned (good or bad), group meetings (may serve as pre- or post-job briefings) and other communication channels.

Emergency	Call 911, notify supervisor, building manager, division management, ESH coordinator
Unplanned events or unexpected results that could affect worker safety and health, the environment, the general public, or Argonne's reputation	Stop work if danger is imminent. Immediately notify supervisor. Many discussions occur among EMC personnel and user both before and after a user visit.

6. Radioactive Materials Summary

This section to be filled out only if this project utilizes radioactive materials

What isotopes and amounts will be involved?

Isotope	Physical Form[a]	Total Quantity Involved[b]	Quantity Typically Used in a Single Experiment[b]
See attached.	Solid metal	See attached	See attached.

[a] Physical form could be salt, powder, liquid, gas, etc.
[b] Specify units (dis/min, Ci, etc.).

Provide a schedule for the necessary radiation monitoring.

HP attending during sample unpackaging and mounting in holder and intoTEM.

Where will the experiment be performed? (Identify all laboratories to be used, as well as hoods and/or glove boxes.)

G147 (fume hood) and G149 (TEM)

What special provisions will be made for waste disposal?

HP will take incidental waste on Friday, Oct. 10 if any activity detected.

Are additional or modified emergency plans required? _____ Yes X No

If so, identify appropriate changes and additions.

Will the experiment involve special nuclear materials? X Yes _____ No

Has the appropriate signage for experimental areas been approved by Health Physics? X Yes _____ No

Have radiation monitors been ordered for all researchers? X Yes _____ No

Estimate the total external radiation dose equivalents from this work (in person-rems): <1micro rem (HP est.)

G. Arias-Fowler — Health Physics Name

Signature

9/29/08 — Date

7. Certification, Review and Approval

7.1 Certification

It is my belief that I have identified all the hazards relating to this work, and that by following the procedures outlined above the Materials Science Division and Argonne National Laboratory will be exposed to an acceptable level of risk. I will make this document available to all participants of the project.

M A Kirk — 26 Sept 08

Signature, Principal Investigator — Date

7.2 Reviewers and Review Comments

List reviewers for this project and indicate (co-)coordinator/chair(s)

Jeffrey Eastman	
David Hinks	
Suzanne te Velthuis	

Hazard level and review process used: High hazard/complexity _____ Low hazard/complexity ____

Review team comment

7.3 Environmental Compliance (NEPA)

The NEPA review is usually carried out in conjuction with the funding proposal that supports this project, prior to this safety review. Environmental Compliance Representative (ECR) comment:

There is possibility of a small amount of low level radioactive waste (wipes etc.) from this projects. PI claims that Health Physics will dispose of it. This needs to be verified. No other environmental concerns.

Urs Geiser — Urs Geiser — 9/26/08

ECR Name — Signature — Date

7.4 Approvals and Authorization

The review team has reviewed the safety of this project and recommends its approval:

Dave Hinks — 10/01/08 — J.M.G.E. — 10/1/08

Chair/Co-chair signature — Date — Co-chair signature — Date

Division director check one:

Approval of this project safety review authorizes this work to begin	
Separate work authorization is required (specify):	

I approve this project safety review:

Mike Pellin — Mike Pellin — 10/02/08

Division Director — Signature — Date

Materials Information

Alloy designation	A	B	D
Alloy Composition (wt%)	67U-5Si-28Al	48U-5Mo-47Al	69U-4Mo-20Al-7Si
Alloy Composition (at%)	$U_{19}Si_{12}Al_{69}$	$U_{10}Mo_3Al_{87}$	$U_{22}Mo_3Al_{56}Si_{19}$
Phase composition(s) Other than Al	$U(Si, Al)_3$,	UMo_2Al_{20}, UAl_4, $U_6Mo_4Al_{43}$	$(U, Mo)(Si, Al)_3$ UMo_2Al_{20}

Structural Information of Various Phases Identified	
$U(Si, Al)_3$ U_{27}-Si_{13}-Al_{60} (at%)	Cubic, $L1_2$ ordered Cu_3Au type, Pm3m, SpaceGroup# 221, Pearson Symbol: cP4 a=b=c=0.426 nm, α=β=γ=90□
$(U, Mo)(Si, Al)_3$ U_{27}-Mo_3-Si_{19}-Al_{49} (at%)	Cubic, $L1_2$ ordered Cu3Au type, Pm3m, SpaceGroup# 221, Pearson Symbol: cP4 a=b=c=0.426 nm, α=β=γ=90□
UMo_2Al_{20} U_5-Mo_7-Al_{88} (at%)	Cubic, Fd-3m, z=8, SpaceGroup# 227, Pearson Symbol: cF184 a=b=c=1.4506 nm, α=β=γ=90□
$U_6Mo_4Al_{43}$ U_{12}-Mo_9-Al_{79} (at%)	Hexagonal, P63mcm, z=2, SpaceGroup# 193, Pearson Symbol: hP106 a=b=1.0966 nm, c=1.7690 nm, c/a=1.613, α=β=90□, γ=120□
UAl_4 U_{22}-Al_{78} (at%)	Body-Centered Orthrohomic, Imma, z=4, SpaceGroup# 74, Pearson Symbol: oI20 a=0.6270 nm, b=1.3710 nm, c=0.4410 nm, α=β=γ=90□

For the proposed IVEM TEM In-Situ irradiation study:

We will only use two TEM dsics for each DU alloy, plus additional one TEM disc as backup for each alloy.
Therefore, the total DU TEM disc samples will be 9, and the average thickness of these DU TEM disc is ~120 microm
This adds together to a total stacking length of approximately 1080 micrometer (1.08 mm)
Considering the small amount of material removed from jet-polishing and ion milling for each TEM disc,
the estimated total radioactive isotopes mass for IVEM study are less than (1.08/27.00)*0.491=0.01964 gram:

Elemet	Mass (g)	Curie count (Ci)
U-235	0.000043	9.53E-11
U-238	0.019600	6.66E-09
sum	0.019643	6.76E-09

ANL Radiological Work Permit (RWP)

RWP No. 2008-212-0060
[X] Specific

Description of Work (If applicable, attach additional sheets and/or reference procedures, work plans, etc.)

Handling of radioactive TEM samples (depleted Uranium alloys) for research purposes in the IVEM-Tandem Facility electron microscope.

Reference Document: Materials Science Division Project Safety Review Safety Analysis

Revision No.: 0
Issue Date: 9/22/2008
Expiration Date: 12/31/2008
RWP Closure or Termination:
Date: _____
By (name) _____

Primary Radiological Concerns and Other Known and Anticipated Hazards (e.g., chemical and physical agents) Potential contamination of equipment

ALARA Review

	Date Completed
[ ] Dept./Div.	n/a
[ ] Laboratory	n/a

Workplace Conditions (Document results of pre-work radiation survey either in the space provided or by attaching survey forms or maps, as appropriate)
By (Health Physics): Helen Redmon

Work Location
Building 212
Room G-147, G-149

General Area Direct	Maximum Direct	Range of Removable Contamination Levels
α n/a	n/a	< 20 dpm / 100 cm^2
General Area	**Maximum**	**Range of Removable Contamination Levels**
βγ n/a	n/a	< 200 dpm / 100 cm^2
Maximum (mR/h)@	**Maximum (mrad/h)@**	**Maximum (mrem/h)@**
γ	βγ	n

Hold Points: > 20 dpm/100 cm2 alpha contamination in the packaging or sample preparation surface area and/or tools..

Control Limits (check operative limits and quantify)
[X] Maximum Individual Dose < 2 mrem
[X] Maximum Collective Dose < 4 mrem
[ ] Other Operational Control Limits: n/a

Collective Dose Estimate: < 4 mrem person-mrem

Special Requirements/Instructions: Sample surface is too fragile to subject to smearing. HPT to survey packaging of materials, assembly area, and survey electron microscope prior to releasing and down posting the room.

Approvals to perform work (Print name, sign and date)

Job Supervisor: Mark Kirk M A Kirk 9/29/08
Health Physicist: Gladys Arias 9/29/08

Concurrence (use additional sheet if necessary)

Print names	Concurrence** Signature/ Date
Jian Gan	
Helen Redmon	
Chris Kolb	
William Stigberg	

ENTRY REQUIREMENTS
Required Rad. Training
[X] RWI [ ] RWII [ ] GERT [X] Other
or GERT + escorted individuals

Pre-job briefing
[ ] Yes [X] No

Dosimetry:
[X] βγ TLD
[ ] Neutron n/a
[ ] Finger Ring n/a
[ ]* Alarming Digital n/a
Rate set _____ mrem/h
Total set _____ mrem
[ ] Supplemental n/a
[ ] Bioassay
[ ] Air Sample

*RWP Dose Tracking/Entry Sheet is recommended

Protective Clothing:
[ ] Lab coat n/a
[X] Gloves 1 pair
[ ] Shoe covers n/a
[ ] Coveralls n/a
[ ] Hood n/a
[ ] Tape all openings n/a
[ ] n/a
[ ] n/a

Respiratory Protection:
[ ] n/a

Engineering Controls:
[ ] n/a

Type of HP Coverage:
as needed

Notify Health Physics:
[X] Before starting work
[ ] Before leaving area
[X] Before removing tools
[X] Other: Upon completion of work

**Provide your signature only if you understand the work and requirements, you agree with the primary concerns and special instructions, and your radiological training is current for the required training.

Project Participant List

I have read the Project Safety Review Documentation listed above and will obey all requirements stated in the document, its accompanying procedures, and in the relevant portions of the ANL safety manuals. I have received the required training, and my Job Hazards Questionnaire (JHQ) accurately reflects my work as a participant in this project.

Name (printed)*	User Level†	ANL Badge No.	Signature	Date
Marquis Kirk		21214		
Peter Baldo		23383		
Ian Gan		Idaho Natl. Lab.		

* Indicate affiliation if not MSD

† Fill out this column only if user levels are explained in the Project Safety Analysis Form. Otherwise, leave blank.

This list is to be signed annually by all participants in the project. The original is to be kept with the division record, and a copy is attached to the original project safety review form and each its copies maintained by the principal investigator at the project locations. This form is updated whenever participants are added or removed, but at least annually.

Addendum to Project No. 20008 of the MSD Project SAF (October 2, 2008).

"Handling weakly radioactive TEM samples at the IVEM-Tandem User Facility"

Responses to second set of comments by review team 11.

Typo's:

Page 1, User's name is misspelled

Should be "Jian Gan"

Page 2, before the first attachment there should be 1 instead of an !

Yes

1.2, On the first line. "TEMt …NL" should be something else.

Should be "TEM at Idaho NL"

3.1, line 3, space before "by"

yes

3.6, "On Oct. 10, 2008" is not a sentence.

Should be "... finished on October 10, 2008."

Other comments:

Section 1.2: Also note that Kirk will remove samples and package for shipment.

Yes, should include this sentence.

Section 1.3: What does "all samples approved through the EMC". Any safety analysis done during the EMC proposal procedure should be attached to this ESAF.

The process begins with user proposal (web based at EMC site) which is reviewed for feasibility and safety by EMC personnel. There are often discussions both before and after proposal submittal between prospective user and EMC personnel. The proposal document can be included with the SAF.

2.1, Get rid of physical hazards, except for the last one, as this potentially could be a sample specific hazard, not covered by SAF's 20004 and 20006.

I agree with this comment.

2.2, Vanishingly small is not a quantitative term. The carcinogenic hazard needs to be addressed too. If these samples are carcinogenic you need an ESH class on carcinogens. Uranium and most likely the alloys are not pyrophoric as solid pieces. Keep only comment about temperature in the physical hazards section. To make the document easier to read there should be a 1:1 correspondence between this section and section 2.1.

With the samples in the metallic alloy solid form, the carcinogenic and pyrophoric nature of an ingestible or inhalationable form are not an issue here.

2.5, Instead of "None" state that no other activities (will) take place in G147 and G149 during this experiment.
SAF 20004 should be mentioned here as well.

Can do. These rooms are explicitly part of the IVEM Facility.

3.1 and 3.2, Mitigation of chemical hazards or physical hazard (how to ensure temp does not get close to 660 C) should be listed here. Check out if the rooms should only be posted when you are handling material since when they are posted all personal entering need to be badged. When not handling the samples only the hoods need to be posted.

The sample temperature is manually controlled by the operator (Kirk). Both sample heater current and thermocouple temperature are monitored continuously. Any over temperature event would be observed. The parameters are continuously monitored by Kirk, Baldo, and/or Gan (user).

3.3, PPE is also necessary when mounting the sample in the microscope in G149. What about lab coats? They are required when handling radioactive material (also special colors were once required-i.e. purple, you should check on this).

HP did not require lab coats (RWP 0060) for this project, but they are available (white) and will be used. Glasses and gloves are always used when inserting stage and sample into microscope.

3.4, Baldo must also have Rad Worker 1 if replacing Kirk

Baldo is qualified with Rad Worker 1.

Section 3.7: Don't you need to fill out the waste form (WMO-195) before HP removes it?

No, HP is taking any incidental contaminated waste to another location.

3.8. What to do in case of radiological contamination of the sample holder, gloves etc. should be listed here.

Yes. The TEM sample holder will be cleaned with tissue and q-tip and methanol if HP detects any contamination.

3.8. second box, Radiological controlled area signage should be mentioned here.

Yes. HP will be posting these rooms for temporary control.

4.2 All participants (Kirk and Baldo too) need to be issues dosimeters so must be listed here (even if they already have dosimeters).

Yes, Kirk and Baldo have dosimeters.

Section 5.1: What about the waste log for radioactive waste?

See section 3.7 comment above.

3.4. & 4.6. For unescorted access to a Controlled Area one needs Rad Worker 1 (see ES&H manual chapter 5). If the user does not get (or have) this training at no time may he be alone (unescorted) in G147 or G149. So, are you saying Kirk or Baldo will be operating the microscope and escorting Gan at all times ? It is worthwhile to spell this out explicitly.
In 4.6 you state no one will work alone … as is usually the case... This last part appears to be in contradiction with what is in ESAF 20006, which does mentioned conditions when "users" or "operators" can work alone, so should be removed.

In addition to Gan (user) having similar Rad. Worker training at Idaho NL, and having several years experience with these depleted uranium alloys, it is the policy of the IVEM in particular that no user works alone, although ESAF 20006 was written to cover all TEMs in the EMC. We do this to be of aid to the user who has often traveled some distance and has limited time on the IVEM, and to protect this valuable user facility from user mistakes.

My general point here is, that although it is clear to me that you will not be unpacking/mounting/inserting into the microscope the samples while alone, I am not certain Gan will not be using the microscope while alone.

With respect to training, please note that according to the ES&H manual chapter 5, ANL can honor Rad worker training from another DOE facility, which might be worth looking into, as it might eliminate the escorting requirement for your user. You should check with HP and our Training reps. on how this can be done.

After the walkthrough I realized, do people in the offices next to G149 use G147 to get to the hall way? If so, designating G147 as a controlled area puts limitation on that, even for just egress purposes. Instead you should probably on have the right half of G147 roped off and designated as a controlled area, or something like that.

Only Kirk, Baldo, and user use this adjacent office space.

Signatures:

M. A. Kirk

M A Kirk 10/02/08

MSD Safety Review Committee 11
(Eastman, Velthuis, Hinks)

Power Hinks 10/02/08
Stephen te Velthuis 10/02/08

M. Pellin (acting MSD Director)

10/02/08

G. Dyrkacz (ALD office)